

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



K-1984

Applicant : Yasumi Sago et al

Title : ELECTRO-STATIC CHUCKING MECHANISM AND SURFACE PROCESSING APPARATUS

Serial No. : 09/879,934

Filed : June 14, 2001

Group Art Unit :

Examiner :

Hon. Commissioner of Patents and Trademarks  
Washington, D. C. 20231

June 7, 2002

SUBMISSION OF INFORMATION DISCLOSURE STATEMENT

Sir:

Submitted herewith are Information Disclosure Statement, European Search Report and three references. Also, three other publications are enclosed.

Please consider the information disclosure statement.

Respectfully submitted,

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JUN 11 2002  
TC 1700

*Ser. 09/899,934*

### Concise Explanation of the relevance

#### No.H07-153825

This publication discloses an electro-static chucking device and a method for processing the chucked object with the device. The object such as semiconductor wafer W is chucked on a dielectric layer 3 having an inner electrode 4. Protrusions 5 and a rim 3a are provided with the surface of the dielectric layer 3. The rim 3a has the same height as the protrusions 5. Coolant gas is introduced between the wafer W and the dielectric layer 3 through a gas introduction channel 6. A DC power source 7 is connected with the inner electrode 4. A high-frequency (HF) power source 9 supplies energy for producing radicals 11, thereby etching the surface of the wafer W. Height of the protrusions 5 is preferably 2.0 micrometer or less, or the center-line average roughness is preferably 0.25 micrometer or less. Proportion of total area of the protrusions 5 to the whole chucking area is preferably 1% or more and under 10 %.

#### No.S60-115226

This publication discloses a method for controlling temperature of a substrate being processed under vacuum pressure. The substrate 50 is placed on a lower electrode 20 facing to an upper electrode 40 in a vacuum chamber 10. An insulator 60 locating at the periphery of the substrate 50 is buried in the lower electrode 20. Trenches 21 are provided with the surface of the lower electrode 20 inside the insulator 60. Coolant gas such as GHe is introduced into the trenches 20 through a gas-flow path 22. Depth of the trenches 20 is greater than clearance of the substrate 50 and the insulator 60, and preferably smaller than the mean-free-path of the coolant gas. The trenches 20 are radial trenches 21a and circumferential trenches 21b, which communicate with each other.

The substrate 50 is chucked electro-statically with the insulator 60. For preventing the substrate 50 from floating up, the required electro-static chucking force is 1.3g/cm<sup>2</sup> under 1Torr of the coolant gas pressure and 0.1Torr of vacuum chamber pressure. Area of the chucked part is about one fifth of the whole back surface area of the substrate 50.

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A plasma is generated by a HF power source 101, thereby etching the substrate 50. The lower electrode 20 is cooled by coolant water circulated through a coolant-feeding path 24 and a coolant drainage path 24b.

#### No.H2-119131

The application disclosed by this publication is the continuation of S58-222046, which was disclosed by the above S60-115226. The relevance is the same as S60-115226.